

Remarks

Claim 19 has been amended to be dependent on claim 16. No new matter has been introduced by this amendment.

1. Rejection under 35 U.S.C. § 103(a)

A. No. 05-60724 in view of Ghahramani

The Examiner has maintained his rejection of claims 1 to 9, 11, 12, 16, 17 and 19 as allegedly obvious over the English-language translation of Patent Application Public Disclosure No. 05-60724 (“No. 05-60724”) in view of U.S. Patent 6,340,741 to Ghahramani *et al.* (“Ghahramani”). In addressing Applicant’s arguments supporting patentability of the pending claims as presented in the previously filed response, the Examiner indicates that both Applicant and the inventors of No. 05-60724 teach a chloride ion-selective membrane comprising a mixture of a polythiol epoxy resin and a polyamide epoxy resin. The Examiner then asserts that Applicant’s discovery that such a mixture can itself act as a chloride ion-selective agent cannot be the basis for patentability of Applicant’s claimed invention for two reasons: (1) Applicant’s independent claims use open-ended “comprising” language in describing the invention and therefore do not exclude additional, unrecited elements or steps; and (2) the properties of a mixture of a polythiol epoxy resin and a polyamide epoxy resin are inherent to the mixture and exist whether or not they are mentioned by the No. 05-60724 description.

Applicant respectfully disagrees with the Examiner’s rejection of Applicant’s claims based on the teaching of No. 05-60724 in view of Ghahramani. No. 05-60724 requires the presence of a chloride ion-selective sensing material which is separate and distinct from the described mixture of a polythiol epoxy resin and a polyamide epoxy resin. Stated differently, No. 05-60724 does not either teach or suggest that the polythiol epoxy resin or polyamide epoxy resin may have chloride ion-selective properties – thus, the requirement of a separate chloride ion-selective material in the compositions of No. 05-60724. In contrast, Applicant has discovered that the particular group of amine agents recited in claim 1 can function as chloride ion exchangers or chloride ion-selective agents as well as a curing agent for the epoxy resin, thus

eliminating the need for a separate chloride ion-selective material. Based on a reading of No. 05-60724, a person of ordinary skill in the art would not have a reasonable expectation of success of maintaining a chloride ion-selective membrane if he were to remove the described chloride ion-selective sensing material from the electrode membrane.

Applicant submits that the chloride ion-selective sensing membrane according to No. 05-60724 is formed from a mixture of a quaternary ammonium salt and an ionic compound of a cyclic quaternary ammonium cation and a high-molecular weight polymer anion – which is significantly different from Applicant's claimed invention. Applicant's invention reflects the discovery that a chloride selective membrane may be formed from a matrix comprising an epoxy resin and an amine agent selected from the group consisting of polyamides, amidoamines and mixtures thereof that are present in stoichiometric excess. Use of the amine agent in a stoichiometric excess as the chloride ion-selective agent eliminates the need for adding additional chloride ionophores or chloride ion exchange agents such as the quaternary ammonium compounds required in No. 05-60724. A person of ordinary skill in the art would clearly find no motivation after a reading of No. 05-60724 that a stoichiometric excess of an amine agent selected from the group consisting of polyamides, amidoamines and mixtures thereof would be able to create chloride ion-selective properties in a membrane to such a degree that the need for additional chloride ionophores or chloride exchange agents are effectively eliminated.

More importantly than the fact that No. 05-60724 does not teach or suggest that the polythiol epoxy resin or polyamide epoxy resin combination may have chloride ion-selective properties, is the fact that this combination as described in No. 05-60724 does not provide chloride ion-selective properties to the membrane. Rather, the combination as described in No. 05-60724 simply forms a support with the purpose of supporting a sensing membrane for use in a chloride ion-selective electrode (see, *e.g.*, claim 1 of No. 05-60724). The sensing membrane described in No. 05-60724 is made chloride ion-selective by the addition of a sensing material that is a mixture of (a) a cyclic quaternary ammonium salt having a plurality of nitrogen atoms per molecule; and (b) an ionic compound of a cyclic quaternary ammonium cation and a high-molecular weight polymer anion (see, *e.g.*, claim 2 of No. 05-60724). It is these (a) and (b)

components as described in No. 05-60724 that provide the chloride ion-selective properties to the membrane – not the mixture of a polythiol epoxy resin and polyamide epoxy resin as claimed by Applicant.

Applicant points out that the object of the invention described in No. 05-60724 is to provide a sensing membrane for chloride ion-selective electrodes in which the hydrophilicity and lipophilicity aspects of the membrane can be controlled and thereby obtain superior performance. No. 05-60724 attempts to achieve this objective by supporting the sensing membrane material with a substrate consisting of a mixture of a polythiol epoxy resin and a polyamide epoxy resin. Therefore, as explained above, the mixture of a polythiol epoxy resin and a polyamide epoxy resin is not part of the membrane, but merely forms a matrix to support the membrane.

Applicant believes that it is not possible to make predictions about the properties of this matrix in respect of ion selectivity from the information provided in No. 05-60724 since it is clear that the matrix (*i.e.*, the mixture of a polythiol epoxy resin and a polyamide epoxy resin) is not intended to function as an ion-selective membrane. As submitted by Applicant in the earlier filed response, and in contrast to Applicant's claimed invention, there is no teaching or suggestion in No. 05-60724 that a stoichiometric excess of polyamides, amidoamines and mixtures thereof may be advantageous. On the contrary, there is a clear indication in No. 05-60724 that the mixture of a polythiol epoxy resin and a polyamide epoxy resin does not possess any chloride ion-selective properties since it is necessary (as taught by No. 05-60724) to add the quaternary ammonium compounds in order to achieve such properties (see, *e.g.*, paragraph [0012] at page 6 and paragraph [0015] at page 8 of No. 05-60724).

As indicated in the Background section of Applicant's specification, fluids in contact with the membrane of the electrode may have the undesirable side effect of extracting quaternary ammonium salts out of the membrane, causing the sensitivity of the membrane to be compromised and also limiting the useful life of the electrode (see, *e.g.*, page 2, lines 5-15 of Applicant's specification). Use of the amine agents recited in Applicant's claims as the chloride ion selective agent eliminates the need to employ such quaternary ammonium compounds as those taught by No. 05-60724. The Examiner asserts that the "comprising" language of Applicant's claims allows for the inclusion of additional, unrecited elements. Applicant points

out that as recited in Applicant's independent claims (*i.e.*, 1, 16 and 18), the amine agent is limited to the group consisting of polyamides, amidoamines and mixtures thereof. None of these groups is a quaternary ammonium compound. Therefore, Applicant's claimed invention does not include quaternary ammonium compounds as the amine agent. Accordingly, Applicant submits that No. 05-60724 is not of particular relevance for the purpose of evaluating the novelty and/or obviousness of Applicant's claimed invention.

Ghahramani cannot remedy the deficiencies present in No. 05-60724. Ghahramani describes a membrane for use in chloride ion-sensitive electrodes that also contains a quaternary ammonium salt as the chloride ion-selective component. The membrane is also described as containing a polymeric matrix of an epoxy resin and an amino compound but there is no teaching or suggestion that the amino compound should be selected from Applicant's claimed recitation of polyamides, amidoamines and mixtures thereof or that there is an unexpected improvement in chloride ion selectivity based on the presence of these particular amine agents.

For at least the above-discussed reasons, No. 05-60724 and Ghahramani, either alone or in combination, do not render obvious Applicant's claimed invention. Applicant therefore requests that this rejection be withdrawn.

Regarding the Examiner's comments about claims 3-9 and 11 as being in a product-by-process format with an unspecified final product, Applicant believes that the above discussion has adequately addressed the Examiner's comments.

B. Craig in view of No. 05-60724

Claim 18 is rejected as allegedly obvious over U.S. Patent 6,015,480 to Craig *et al.* ("Craig") in view of No. 05-60724. According to the Examiner, it would have been obvious to use the chloride selective membrane of No. 05-60724 in the invention of Craig.

Applicant respectfully disagrees with the Examiner's rejection of Applicant's claim 18 based on the teaching of Craig in view of No. 05-60724 for at least the reasons discussed above in Section A, *i.e.*, that No. 05-60724, either alone or in combination with Ghahramani, does not teach or suggest Applicant's claimed chloride ion selective membrane. Further, there is no

motivation to combine the teachings of Craig with No. 05-60724. Therefore, Applicant requests that this rejection be withdrawn.

2. Allowable Subject Matter

Claims 10, 13 to 15, 20 and 21 are objected to as being dependent on a rejected base claim, but are indicated by the Examiner as being allowable if rewritten in independent form.

Applicant believes that the comments submitted by Applicant in section 1 of the current Office Action are sufficient to result in an allowance of all of the pending claims.


3. Conclusion

The foregoing amendments and remarks are being made to place the application in a condition for allowance. Applicant respectfully requests reconsideration and the timely allowance of the pending claims. Should the Examiner find that an interview would be helpful to further prosecution of this application, he is invited to telephone the undersigned at his convenience.

Except for issue fees payable under 37 C.F.R. 1.18, the Commissioner is hereby authorized by this paper to charge any additional fees during the entire pendency of this application including fees due under 37 C.F.R. §§ 1.16 and 1.17 which may be required, including any required extension of time fees, or to credit any overpayment to Deposit Account 50-0310. This paragraph is intended to be a **Constructive Petition for Extension of Time** in accordance with 37 C.F.R. 1.136(a)(3).

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